

expanding chamber 38 draws water through the intake tube 36 and into chamber 38. The flow of water into the expanding chamber 38 opens check valve 43 that is normally biased in a closed position. Removal of water from the storage tank creates a vacuum within the storage tank which is equalized by air passing through check valve 26.

The compression stroke created by the advancement of the piston 34 within the cylinder 35 causes the water within the chamber 38 to become pressurized. The pressure of the water opens check valve 44 that leads to the elastic bladder 30 of pressure tank 19. As the piston is reciprocated within its cylinder, water is repeatedly drawn from the storage tank and deposited into the elastic bladder 30 through outlet tube 37 and tube 41. As more and more water is drawn and forced into the bladder 30 the bladder expands within outer shell 29 once the water therein exceeds a volume contained within the relaxed bladder. This may occur until the force used to drive the piston can no longer overcome the stored pressures, or the water pressure reaches a preselected pressure level which overcomes the biasing force exerted by pinch bar 47 so as to allow the water to be released through delivery tube 45. The expansion of the elastic bladder 30 creates a force upon the water therein, i.e. the expanded elastic bladder pressurizes the water therein. The pressurized water is prevented from escaping the pressure tank through outlet tube 37 by check valve 44. So long as the elastic bladder 30 is expanded it provides a force upon the water therein.

To release the pressurized water from the gun the trigger 17 is manually pulled to overcome the biasing force exerted by spring 48 upon pinch bar 47. Movement of pinch bar 47 from delivery tube 45 causes the pressurized water within tube 41, delivery tube 45 and pressure tank bladder 30 to be released as a stream from nozzle 21. The bladder contracts with expulsion of water therefrom but maintains a pressure upon the water until the bladder reaches a relaxed configuration. It should also be understood that the water gun may emit a stream of water while simultaneously pumping water through actuation of handle 33.

It should be understood that the outer shell 29 protects the elastic bladder 30 from direct contact which may cause its rupture. Also, the outer shell encases the bladder so as to provide an elastic limit so that the bladder is not overinflated or pressurized beyond its elastic limits. Nevertheless, it should also be understood that the outer shell is not mandatory.

With reference next to FIG. 3, an expandable, elastic pressure tank 55 in another preferred form is shown as an alternative to that shown in FIGS. 1 and 2. It should be understood that the remaining portions of the gun to which tank 55 is mounted are the same as previously described. Here, the pressure tank 55 has a housing 56 defining a chamber 57 and a neck 58 mounted to gun housing 11. The pressure tank 55 also has a plunger 60 movably mounted within chamber 57 and a spring 61 biasing the plunger 60 toward neck 58. The plunger 60 has a O-ring 62 which creates a seal between the plunger 60 and housing 56. The plunger 60 is shown in phantom lines in an unpressurized, expanded position and a pressurized, expanded position in solid lines. Thus, the term "expanded" is meant to describe the increase in fluid capacity within the pressure tank as the plunger is moved therein and not necessarily to the structure of housing 56, i.e. the casing. Similarly, the term "elastic" is meant to describe the changes in the size of chamber 57 as the plunger is moved within the housing.

In use, the pump 32 forces water into chamber 57 through neck 58. As more and more water is forced into chamber 57

the plunger 60 moves upward against the biasing force of the spring 61 from its unexpanded position to its expanded position. The compression force of the spring 61 upon the plunger maintains pressure upon the water within chamber 57 which enables the water to be expelled from the gun. As in the previous embodiment the orientation of the gun has no significant effect on its internal operation.

The expandable pressure tanks as just described maintain a more constant pressure upon the water therein as compared to pressure tanks of the prior art utilizing compressed air. This is due to the fact that as water is removed from the pressure tank the volume of airspace increases while the quantity of air remains the same. This results in a rapid decrease in air pressure pressurizing the water within the tank.

It should be understood that an electrically motorized pump may be used in place of the manually actuated pump shown in the preferred embodiment.

It thus is seen that a toy water gun is now provided which maintains a more constant pressure upon liquid while being dispensed from the pressure tank. While this invention has been described in detail with particular references to the preferred embodiments thereof, it should be understood that many modifications, additions and deletions, in addition to those expressly recited, may be made thereto without departure from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. A water gun comprising a housing; a storage reservoir adapted to hold liquid; an expandable pressure tank adapted to hold liquid and to expand under induced tension upon introducing liquid in excess of a selected volume therein and thereby exert a force upon the liquid; a pump for drawing liquid from said storage reservoir and depositing the drawn liquid into said expandable pressure tank; conduit means for conveying liquid from said expandable pressure tank to ambience; and control means for controlling the flow of liquid through said conduit means.
2. The water gun of claim 1 wherein said expandable pressure tank comprises an elastic bladder.
3. The water gun of claim 2 expandable pressure tank further comprises a protective shell encasing said elastic bladder.
4. The water gun of claim 1 wherein said expandable pressure tank has a chamber, a movable plunger mounted within said chamber, and spring biasing means for biasing said plunger in a direction to exert force upon liquid contained within said chamber.
5. The water gun of claim 1 further comprising limiting means for limiting pressure within said expandable pressure tank.
6. The water gun of claim 1 further comprising a check valve for preventing water within said expandable pressure tank from returning to said storage reservoir.
7. A water gun comprising
a liquid storage reservoir;
an elastic pressure tank adapted to be expanded and contracted upon changes in the volume of liquid pumped therein;
a liquid pump;
first conduit means for conveying liquid contained within said storage reservoir to said pump;
second conduit means for conveying liquid from said pump to said elastic pressure tank;
third conduit means for conveying liquid from said elastic pressure tank to ambience; and

control means for controlling the flow of liquid through said third conduit means,
whereby liquid within the storage reservoir is pumped into the elastic pressure tank through the first and second conduits thereby forcing the elastic pressure tank to its second configuration so as to pressurize liquid therein which is controllably released from the elastic pressure tank through the third conduit means by actuation of the control means.

8. The water gun of claim 7 wherein said elastic pressure tank comprises an elastic bladder.

9. The water gun of claim 8 elastic pressure tank further comprises a protective shell encasing said elastic bladder.

10. The water gun of claim 7 wherein said elastic pressure tank has a chamber, a movable plunger mounted within said chamber, and spring biasing means for biasing said plunger in a directing to exert force upon liquid contained within said chamber.

11. The water gun of claim 7 further comprising a limiting means for limiting pressure within said elastic pressure tank.

12. The water gun of claim 7 further comprising a check valve for preventing water within said elastic pressure tank from returning to said storage reservoir.

13. A water gun comprising a housing, a storage reservoir; elastic pressure tank means for exerting pressure on a body

of liquid therein of a magnitude relative to the volume of the body of liquid; means for drawing liquid from said storage reservoir and depositing the drawn liquid into said elastic pressure tank means; conduit means for conveying liquid from said elastic pressure tank means to ambience; and control means for controlling the flow of liquid through said conduit means.

14. The water gun of claim 13 wherein said elastic pressure tank means comprises an elastic bladder.

15. The water gun of claim 14 elastic pressure tank means further comprises a protective shell encasing said elastic bladder.

16. The water gun of claim 13 wherein said elastic pressure tank means has a chamber, a movable plunger mounted within said chamber, and spring biasing means for biasing said plunger in a directing to exert force upon liquid contained within said chamber.

17. The water gun of claim 13 further comprising a limiting means for limiting pressure within said elastic pressure tank means.

18. The water gun of claim 13 further comprising a check valve for preventing water within said elastic pressure tank means from returning to said storage reservoir.

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19. (New) A water gun comprising a housing; a storage reservoir adapted to hold liquid; an expandable pressure tank adapted to hold liquid and to expand under induced tension upon introducing liquid in excess of a selected volume therein and thereby exert a force upon the liquid; a pump for drawing liquid from said storage reservoir and depositing the drawn liquid into said expandable pressure tank; conduit means for conveying liquid from said expandable pressure tank to ambience; and a trigger functionally coupled to said conduit means, whereby the actuation of the trigger causes water to be expelled through the conduit means.

20. (New) The water gun of claim 19 wherein said expandable pressure tank comprises an elastic bladder.

21. (New) The water gun of claim 20 expandable pressure tank further comprises a protective shell encasing said elastic bladder.

22. (New) The water gun of claim 19 wherein said expandable pressure tank has a chamber, a movable plunger mounted within said chamber, and spring biasing means for biasing said plunger in a direction to exert force upon liquid contained within said chamber.

23. (New) The water gun of claim 19 further comprising limiting means for limiting pressure within said expandable pressure tank.

24. (New) The water gun of claim 19 further comprising a check valve for preventing water within said expandable pressure tank from returning to said storage reservoir.

25. (New) A water gun comprising

a liquid storage reservoir;

an elastic pressure tank adapted to be expanded and contracted upon changes in the volume of liquid pumped therein;

a liquid pump;

first conduit means for conveying liquid contained within said storage reservoir to said pump;

second conduit means for conveying liquid from said pump to said elastic pressure tank;

third conduit means for conveying liquid from said elastic pressure tank to ambience; and

a trigger coupled to one said conduit means,

whereby liquid within the storage reservoir is pumped into the elastic pressure tank through the first and second conduits thereby forcing the elastic pressure tank to its second configuration so as to pressurize liquid therein which is controllably released from the elastic pressure tank through the third conduit means by actuation of the trigger.

26. (New) The water gun of claim 25 wherein said elastic pressure tank comprises an elastic bladder.

27. (New) The water gun of claim 26 elastic pressure tank further comprises a protective shell encasing said elastic bladder.

28. (New) The water gun of claim 25 wherein said elastic pressure tank has a chamber, a movable plunger mounted within said chamber, and spring biasing means for biasing said plunger in a direction to exert force upon liquid contained within said chamber.

29. (New) The water gun of claim 25 further comprising a limiting means for limiting pressure within said elastic pressure tank.

30. (New) The water gun of claim 25 further comprising a check valve for preventing water within said elastic pressure tank from returning to said storage reservoir.

31. (New) A water gun comprising a housing, a storage reservoir; elastic pressure tank for exerting pressure on a body of liquid therein of a magnitude relative to the volume of the body of liquid; a pump which draws liquid from said storage reservoir and depositing the drawn liquid into said elastic pressure tank; a conduit which conveys liquid from said elastic pressure tank to ambience; and a trigger, whereby the trigger controls the flow of liquid through the conduit.

32. (New) The water gun of claim 31 wherein said elastic pressure tank comprises an elastic bladder.

33. (New) The water gun of claim 32 elastic pressure tank further comprises a protective shell encasing said elastic bladder.

34. (New) The water gun of claim 31 wherein said elastic pressure tank has a chamber, a movable plunger mounted within said chamber, and spring biasing means for biasing said plunger in a direction to exert force upon liquid contained within said chamber.

35. (New) The water gun of claim 31 further comprising a limiting means for limiting pressure within said elastic pressure tank means.

36. (New) The water gun of claim 31 further comprising a check valve for preventing water within said elastic pressure tank from returning to said storage reservoir.

37. (New) A water gun comprising a housing, a storage reservoir; elastic pressure tank for exerting pressure on a body of liquid therein of a magnitude relative to the volume of the body of liquid; a pump which draws liquid from said storage reservoir and depositing the drawn liquid into said elastic pressure tank; a conduit which conveys liquid from said elastic pressure tank to ambience; and a controller functionally coupled to the conduit, whereby the controller controls the flow of liquid through the conduit.

38. (New) The water gun of claim 37 wherein said elastic pressure tank comprises an elastic bladder.

39. (New) The water gun of claim 38 elastic pressure tank further comprises a protective shell encasing said elastic bladder.

40. (New) The water gun of claim 37 wherein said elastic pressure tank has a chamber, a movable plunger mounted within said chamber, and spring biasing means for biasing said plunger in a direction to exert force upon liquid contained within said chamber.

41. (New) The water gun of claim 37 further comprising a limiting means for limiting pressure within said elastic pressure tank means.

42. (New) The water gun of claim 37 further comprising a check valve for preventing water within said elastic pressure tank from returning to said storage reservoir.